

# Sustainable development

Much of the vast literature on the environment and the economy could be interpreted as a response to the concern that present patterns of economic growth may seriously degrade the environment and may be unsustainable, as the environment cannot support economic growth forever. This proposition may or may not be substantially true. At its heart lies the view that past and present economic policies have usually been concerned with providing the conditions for equilibrium economic growth, as measured by standard national accounting methods. Many environmentalists are concerned that these policies have not attempted to ensure 'the existence of ecological conditions necessary to support human life at a specified level of well-being through future generations' (Lele, 1991). This concern is of major importance in the concept of **sustainable development**. Sustainable development has become perhaps the most important approach to considering the environment and development.

There is a wide range of definitions and interpretations of the meaning of 'sustainable development'. The term first came to prominence in the *World Conservation Strategy*, presented in 1980 by the International Union for the Conservation of Nature and Natural Resources. It was popularized by the World Commission on the Environment and Development's study *Our Common Future* (1987), which is also known as the Brundtland Report, named in honour of its chairperson, the Norwegian prime minister. These and other studies have defined sustainable development in different ways. The most frequently quoted definition comes from the latter study:

Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability of future generations to meet their own needs.

This definition would appear uncontroversial and is remarkably similar to the neoclassical definition of income that we gave earlier by Hicks (1946). However, the interpretation differs in that *Our Common Future* examined how sustainable development can be achieved. This inevitably requires the making of value judgements that link the definition and the operational objectives that it has



been suggested will result in the attainment of sustainable development. For this reason, there has been criticism of the connection between the definition and the operational objectives. The objectives are increasing economic growth, meeting basic needs, involving more of the population in decision-making and development, controlling population growth, conserving and improving the environment, accounting for the environment in economic decision-making, changing technology, managing risk and changing international economic relationships.

The concept of sustainable development has gained very wide acceptance and has become a standard model for thinking about the environment, development and the economy. Most countries attending the Rio Earth Summit in 1992 accepted the general idea of sustainable development, for example as enshrined in the *Agenda 22* process agreed at this summit (United Nations, 1993). The United Nations 2005 World Summit 'reaffirmed [its] commitment to achieve the goal of sustainable development [and its] three components ... economic development, social development and environmental protection' (United Nations, 2005). However, as suggested above, what the concept of sustainable development should imply for economic and environmental policies is disputed. In particular, the concern for equity between and within generations is central to most interpretations of the concept, but it is unclear how the welfare of individuals can be compared. One of the major controversies concerning the approach of the Stern Review (2006) is the low discount rate which is used to compare costs and benefits for different generations. This is a central problem in neoclassical economics and the concept of sustainable development does not appear to provide a solution to the problem.

## Natural capital, equity and environmental values

In defining the notion of sustainable development, it is common to require that the stock of capital be non-declining through time. A constant or increasing stock of capital allows consumption levels to be maintained or increased. However, there are major differences of opinion over the capital stock that must be held constant or increased. The weak sustainability view considers all the different forms of capital (for example, man-made, human, natural and social capital) to be substitutes and that they can be aggregated into total capital. Thus, for example, degrading the natural fertility of the soil can be compensated for through using fertilizers and the methods of agricultural science to maintain crop yields. In this example, human and man-made capital are used to substitute for natural capital.

The alternative view of strong sustainability takes the position that it is only natural capital that needs to be held constant or increased. In this view, the focus is often on critical natural capital which is either required for human survival or cannot be substituted for other forms of capital. Thus, one might take atmospheric global warming gas levels that cause climate change as critical natural capital as higher levels cannot be offset by other capital. For an economic comparison and analysis of weak and strong sustainability, see Hanley and Atkinson (2003). However it might be argued that some of the effects of climate change resulting from higher global warming gas levels can be adapted to through additional sea defences and migration of population (see the discussion of the Stern Review later in this chapter, p. 373).

Underlying the analysis of the environment and development, and the importance of natural capital, are views about environmental values. The study of environmental values suggests three possible ways in which these values could be generated. First, the preferences of individuals give rise to values that, with a complete set of perfect markets, are reflected in the prices of goods and services. This is the neoclassical approach to valuation, and examples of market failure



have already been examined. Market failures suggest that the environment will not be adequately accounted for in the operation of market economies.

The second source of environmental values is that of social preferences. Sagoff (1988) has suggested that individuals are capable of considering issues, in particular those concerning the environment, from the point of view of society. It is not clear how such values could be established in the psyche of individuals. A possible explanation is a socio-biological one in that individuals behave as social organisms for the benefit of the species (Dawkins, 1976). Environmental choices are so complex that even if social preferences exist it is difficult to assume that, apart from in a tautological sense, they will result in decisions that improve social welfare. However, it has been suggested that the poor in developing countries are the most dependent on the environment. Thus if social preferences are to give weight to the circumstances of the poor, the environment should be given greater weight than would occur from simple aggregation of the individual values placed on the environment.

The third source of environmental values follows from the belief that ecological systems have an intrinsic value independent of any value placed on them by humans (see Booth, 1994; Common and Stagl, 2005). The individual-preferences basis for values considers only human beings to have rights. The ecological view represents the extension of rights to other species. How these rights can be measured is a difficult problem. The ecological-values view suggests that greater weight should be attached to the environment than would be given by taking just social values or simple aggregation of individual values.

Preserving or increasing the stock of natural capital has important effects on intergenerational equity. If it is believed that present levels of environmental degradation and resource use will substantially alter future human economic welfare, then intergenerational equity may be improved by the constraint that the stock of natural capital should be preserved. This is the strong sustainability view. However, the substitution of this constraint by a more flexible approach that allows some use of natural capital could conceivably increase economic welfare measured across all present and future generations. This is the weak sustainability view.

The use of a positive discount rate weights future environmental effects less heavily than those effects occurring in the present. This has been criticized as underestimating the importance of environmental degradation and resource use. This criticism is misplaced. If the arguments are accepted of a social preference for the present compared with the future, then discounting is appropriate. If it is felt that too little weight is being attached to future environmental effects, their estimated values should be adjusted, but not the discount rate.

Many environmental effects are irreversible – for example, the extinction of a species. Irreversibility has been used as an argument for maintaining the natural capital stock. However, the dislike of irreversible losses in natural capital can be captured by the concepts of option, quasi-option and existence values.

The resilience of an ecosystem is its ability to maintain its normal functions after an external disturbance (Common and Stagl, 2005). It has been suggested that the larger the stock of natural capital, the more resilient an ecosystem is likely to be. This argument is justified on the basis of the idea that the diversity of the ecosystem increases its resilience. However, the notion of resilience and the related concept of stability have been criticized, as no ecosystem is likely to be globally stable and constant through time. This implies that the size of the external disturbance is important (Norton, 1987).

As discussed previously, uncertainty is crucial to the analysis of the relation between the environment and the economy. A possible policy response to such uncertainty is to adopt policies



that provide insurance against possibly disastrous future outcomes. This risk-averse strategy of emphasizing the worst possible outcome might be justified by, say, the worst forecasts of the disastrous outcomes of global warming. This argument supports the setting of a constraint that keeps the stock of natural capital fixed. Alternatively, it has been argued (e.g. see Lomberg, 2001) that the vast expenditure necessary to reduce global warming, the long period before such effects become important and the lack of absolutely clear scientific proof of the size of these effects suggest that a conservative approach ought to be adopted. It is unclear how uncertainty should be included in environmental decision-making, but it is clear that the treatment of uncertainty has a very important effect on the actual decisions that have been or will be taken.

Arguments about weak and strong sustainability, sources of environmental values, discounting, irreversibility, uncertainty and resilience suggest a higher value should perhaps be placed on the environment than the operation of a market economy would give. Strictly, this is not the same as suggesting that the stock of natural capital should be maintained. However, the complexity of decision-making on the environment might require a very approximate constraint on the use of environment such as preserving the stock of natural capital.

This critical discussion of the concept of sustainable development suggests that the environment has an important role in economic development and this may not have been fully understood in the past. The concept of sustainable development has won many academic and political adherents. However, there are differences in opinion whether natural capital deserves special protection in economic development or whether it can be traded off against man-made and human capital. These differences are important in determining how the environment enters into economic decision-making.

There are also practical difficulties with the implementation of a constraint that keeps the stock of natural capital fixed. The environment is made up of many different resources and services. Constancy of the stock of natural capital could be interpreted as constancy of all types of natural capital. This interpretation implies that any positive use of non-renewable resources would not be compatible with sustainable development and is difficult to justify.

The alternative interpretation is to consider a single measure of natural capital that appropriately weights the different types of natural capital. The obvious weights are the values of the various types of natural capital. These values may not only reflect the ideas considered in equation (12.6), but also the distributional views that are often associated with the idea of sustainable development. However, placing values on the different types of natural capital would appear to deny the special role of such capital. If different forms of natural capital can be valued so as to give a single measure, this suggests that it can be traded off against man-made and human capital and requires no special protection in the process of development.

It may be the case that a single measure of most types of natural capital would be desirable, with individual measures for the remaining and critical types of natural capital, for example atmospheric levels of greenhouse gases.

If the view is taken that the environment must be preserved, then social cost-benefit analysis of a project should be carried out subject to the additional constraint that the net effects on the environment are zero or positive. The strength of this additional constraint can be weakened by adding environmentally friendly investments to the project that allow the constraint to be met. If it is considered necessary to preserve the different types of natural stock, then there must be an additional constraint for each type of natural capital.

The constraint of preservation of all aspects of the environment implies that national income accounting methods cannot be altered to allow the calculation of one measure of economic



welfare that includes environmental effects. Thus it has been suggested that measures of economic welfare be presented alongside a set of indicators of the state of the environment. The less restrictive interpretation of the concept of sustainable development allows substitution between different forms of capital and the simple inclusion of the environment in social cost-benefit analysis and national income accounting (see World Bank website). The inclusion of the environment simply requires the correct valuation of environmental effects.

## Economic thought and the environment<sup>10</sup>

Classical economists such as Malthus, Ricardo and Mill were generally pessimistic about the possibility of continued economic progress.<sup>11</sup> These economists assumed that there were diminishing returns to factors of production and the supply of land was fixed. The growth in population, and thus the labour force, would lead to reductions in the marginal product of labour and a declining average product of labour. Malthus and Ricardo assumed a constant technology, with the inevitable result that average agricultural production per unit of labour would decline. Mill considered that technical progress could offset the effect of diminishing returns to a factor, but was unlikely to do so in the long run. Marshall (1890) invented the idea of an externality and it was developed by Pigou (1920). However, in general, environmental externalities were considered to be unimportant.

The start of the debate about the environment and the economy is usually attributed to Rachel Carson and her book *Silent Spring* (1962). Other early contributions to the environmental debate were made by Boulding (1966), the Ehrlichs (1970), Goldsmith et al. (1972), Forrester (1971), Schumacher (1973) and Commoner (1972). A most influential environmental publication was *The Limits to Growth* by Meadows et al. (1972). The basic point of this study was that there are a number of non-renewable resources whose present levels of consumption are such that the known reserves will be exhausted in the not so distant future. The study was heavily criticized for not allowing for the effects of the price mechanism to reduce consumption and provide incentives to explore for new reserves and develop new technologies.

These environmental contributions to the debate stimulated economic interest in the relation between the environment and the economy. Barnett and Morse (1963) could find little evidence of resource scarcity in the US economy in the period 1850–1957. Dasgupta and Heal (1979) provided a rigorous neoclassical analysis of the depletion of exhaustible natural resources. Kneese et al.'s (1970) development of the **materials balance approach** changed the view that some economists had of how the economic system dealt with the environment's waste absorption function. This simple principle states that all resources that flow into an economic system must eventually end up as waste products.

The debate about the environment and the economy has changed public views, and in particular the views of international agencies have changed.